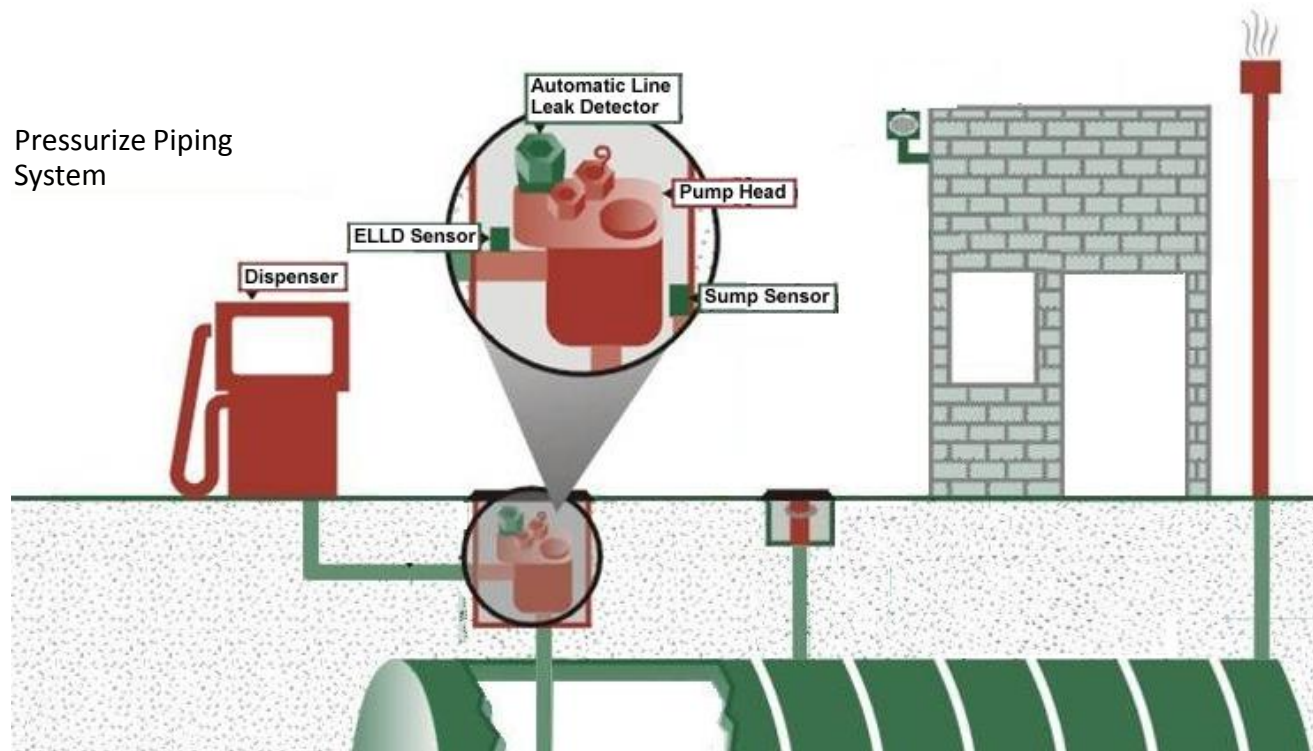


There are two types of systems used to pump fuel through UST product lines: Suction pumping systems and pressurized pumping systems. In a suction pumping system, the pump is located inside the dispenser cabinet, and the fuel is drawn from the tank by suction. In a pressurized piping system, the pumping mechanism is located inside the UST near the bottom of the tank. The pump moves the fuel through the piping under a pressure of approximately 30 pounds per square inch.



## Pressurized Piping Systems

---

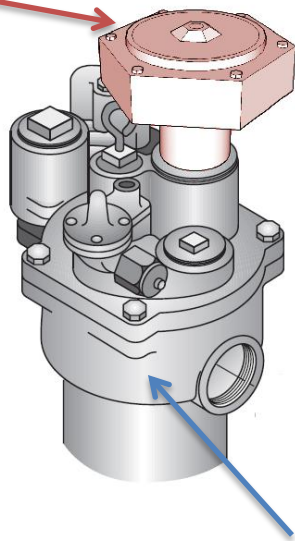
Because the pumps are located inside the tank and operate under positive pressure, even large leaks in the piping do not affect the operation of the fuel dispensing system, and without leak detection would go unnoticed. North Dakota UST rules require two types of leak detection on pressurized piping:

- A mechanism or method to detect a “large” leak at a rate of 3 gallons per hour; ***and***
- A mechanism or method to detect a “small” leak at a rate of 0.2 gallon per hour monthly OR 0.1 gallon per hour yearly.

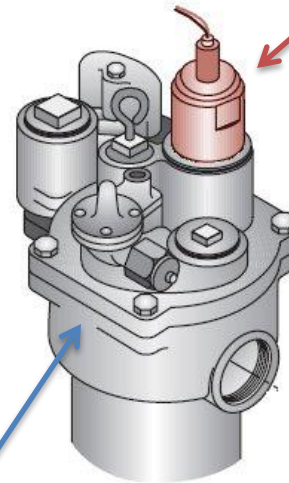
## Detecting Large Leaks

To find a “large” leak in pressurized piping, the pumping system must have equipment that can continuously monitor for leaks or include a device called an automatic line leak detector (ALLD). There are two types of ALLDs: **mechanical** and **electronic**.

Mechanical Line  
Leak Detector



Electronic Line  
Leak Detector



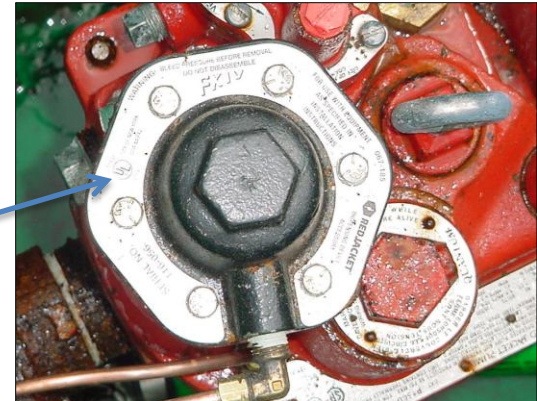
Pressurized Line Pump Head

## Detecting Large Leaks

**Mechanical ALLDs** - With a mechanical line leak detector, a leak will be indicated by a reduction in the flow of fuel (normal flow is 7 to 10 gallons per minute.) The mechanical line leak detector is threaded into the pump head and has no wiring connections. They usually have a round or hexagonal top and should have a stamped brand name like Red Jacket, EBW, Vaporless, FE Petro or Veeder-Root.



A Red Jacket mechanical line leak detector capable of detecting a leak of 3 gallons per hour

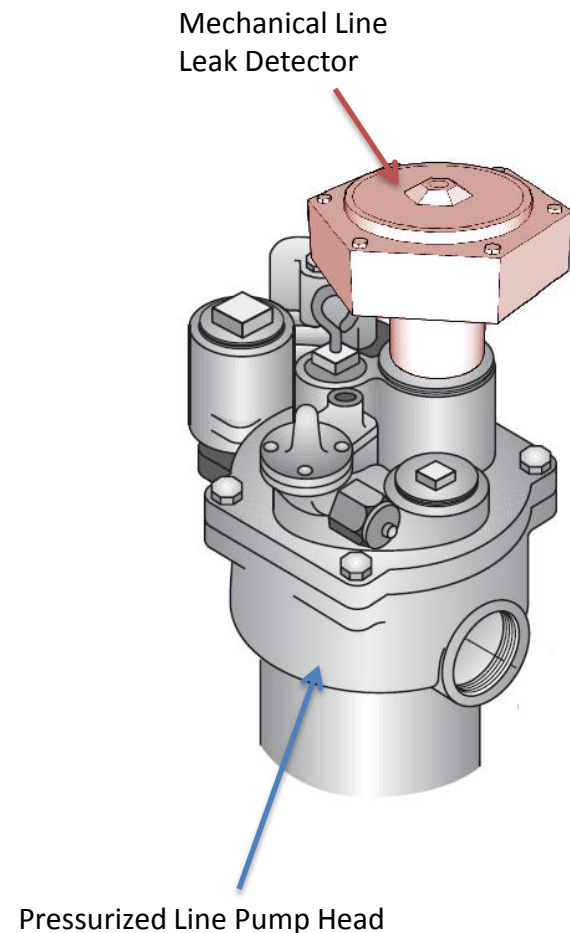


## Detecting Large Leaks

**Mechanical ALLDs** - *If the UST facility has mechanical ALLDs, the operator must respond immediately to customer complaints of slow fuel flow which could indicate a leak!!!*

Things other than leaks can cause slow flow (for example plugged filters, defective pump motors). The facility operator should call a service technician to determine the cause. Cold temperatures may also cause a mechanical ALLD to go into slow flow. If the slow flow only affects one customer, it is likely because of temperature effects. If the slow flow persists however, a service technician should be called.

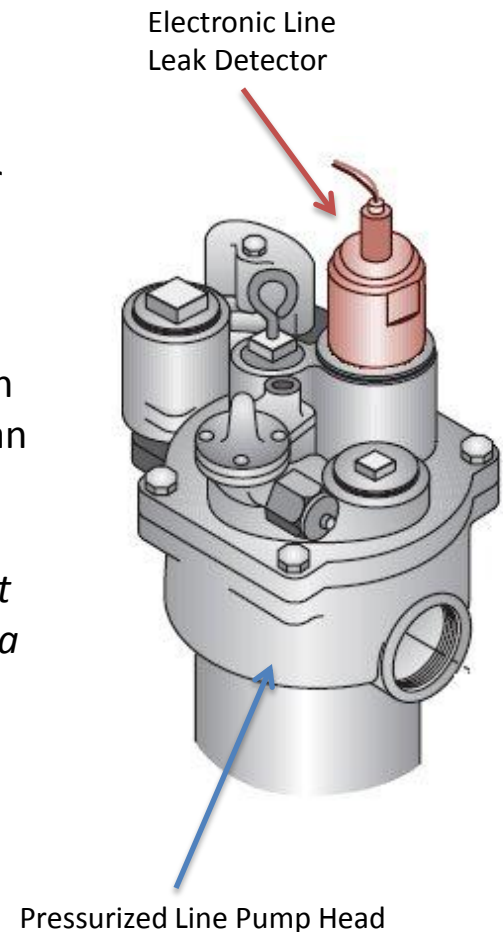
Mechanical ALLDs wear out and typically need to be replaced every few years. The North Dakota UST Rules require ALLDs to be tested annually (or as per manufactures recommendations) for operation by a qualified technician.



## Detecting Small Leaks

**Electronic ALLDs** - With an electronic ALLD, the leak detector will shut down the pump when a small leak is detected. This is a much more reliable indicator of a problem than the *slow flow* of a mechanical line leak detector. Electronic ALLDs use a special sensor that monitors the pressure inside the piping system between customer transactions, when the pressure should be stable. A loss of pressure in the piping may indicate a leak. Electronic ALLDs are usually connected to an alarm at an automatic tank gauge (ATG). An electronic ALLD may also have the ability to detect leaks smaller than .2 gallons per hour.

*Both mechanical and electronic ALLDs must have a functionality test performed annually (or as per manufactures recommendations) by a qualified service technician.*





## Detecting Small Leaks

**Electronic ALLDs** - Like the mechanical ALLD, the electronic line leak detector is also threaded into the pump head. It is either wireless or hard-wired to the pump electrical system. Common brand names are Red-Jacket, Incon and Veeder-Root.



Red Jacket ELLD



InCon ELLD



Veeder-Root ELLD

## Detecting Small Leaks

---

Because of the significant environmental hazard posed by pressurized pumping systems, the North Dakota UST Rules also require pressurize piping to find small leaks, leaks of .2 gallons per hour or less, in addition to the requirements of finding leaks greater than 3 gallons per hour.

There are several options for finding “small” leaks in a pressurized piping system:

- Monthly monitoring with an electronic line leak detector at the rate of 0.2 gallons per hour;
- Annual line tightness test performed by a qualified technician or with an electronic ALLD at the rate of 0.1 gallon per hour (EPA approved to perform test at 0.1 gph);
- Monthly Statistical Inventory Reconciliation (SIR); or
- Continuous monitoring using sump sensors with double-walled or secondary containment piping.
- Monthly visual inspection of piping sumps.



## Detecting Small Leaks

---

### ***Monthly Monitoring With An Electronic Line Leak Detector***

Electronic line leak detector tests may be used to meet the monthly leak detection requirements for your piping. In order to meet the leak detection requirements, a .2 gallon per hour test must be performed every month. *A copy of the printout or log showing the results of the test must be kept at the facility for 12 months.*

You must also conduct annual tests that demonstrates proper functioning on each line leak detector according to the manufacture's requirements. Most manufacturers require this test be performed every 12 months (annually).

## Detecting Small Leaks

### Monthly Monitoring With An Electronic Line Leak Detector

These are examples of printouts from an automatic tank gauging system. The printout on the left is an example of a line leak test using an electronic line leak detector. The printout on the right shows how much product is in the tanks. If you use electronic equipment to monitor for leaks, you must know how to use the equipment.

A line leak test report that was printed from a tank monitoring system.

```
MMM DD, YYYY HH:MM XM
PRESSURE LINE LEAK TEST
RESULTS
Q 1:UNLEADED REG LINE
3.0 GAL/HR RESULTS:

LAST TEST:
MMM DD,YYYY HH:MM XM PASS

NUMBER OF TESTS PASSED
PREV 24 HOURS : 123
SINCE MIDNIGHT : 81

0.20 GAL/HR RESULTS:

MMM DD,YYYY HH:MM XM PASS
MMM DD,YYYY HH:MM XM PASS

0.10 GAL/HR RESULTS:

MMM DD,YYYY HH:MM XM PASS
MMM DD,YYYY HH:MM XM PASS
```

A report printed by the same system showing how much fuel is in each tank. **This is not a printout of a line leak test.**

```
MMM DD, YYYY HH:MM XM
INVENTORY REPORT

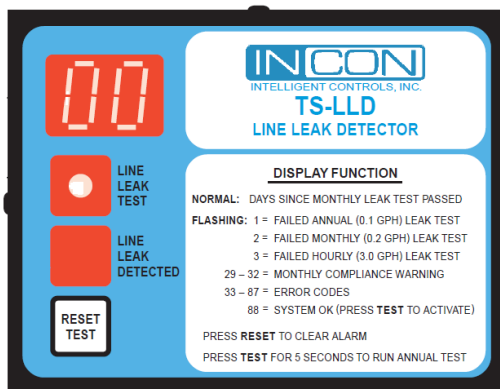
T 1:UNLEADED GASOLINE
VOLUME      = 8518 GALS
ULLAGE      = 1482 GALS
90% ULLAGE= 482 GALS
TC VOLUME   = 8492 GALS
HEIGHT      =76.26 INCHES
WATER VOL   = 0 GALS
WATER       = 0.00 INCHES
TEMP        = 64.6 DEG F

T 2:SUPER UNLEADED
VOLUME      = 7545 GALS
ULLAGE      = 2455 GALS
90% ULLAGE= 1455 GALS
TC VOLUME   = 7569 GALS
HEIGHT      =67.76 INCHES
WATER VOL   = 0 GALS
WATER       = 0.00 INCHES
```

## Detecting Small Leaks

### Monthly Monitoring With An Electronic Line Leak Detector

Some electronic line leak detection systems do not print test results, such as the InCon TS-LLD. If you have one of these systems, you will still need to record the test results every month. In a log book or form provided by the North Dakota Department of Health, enter the tank and line number, the date, and the status of the leak test. The form "[Monthly Electronic Line Leak Detector Record](#)" is available at the NDDoH Underground Storage Tank Program website to record the monthly tests.



InCon line leak detector display

Monthly Electronic Line Leak Detector Record			
Product Line <u>Premium</u>		ELLD Make/Model <u>InCon TS-LLD</u>	
Month	OK (✓)	Leak Detector Tripped (✓)	Reason Leak Detector Tripped
January	✓ "00"		
February	✓		
March	✓		
April		✓	Equipment malfunction - fixed 4.12.10
May			
June			
July			

Sample electronic line leak detector log

## Detecting Small Leaks

---

### *Annual Line Tightness Test*

Annual line tightness testing may be used in combination with mechanical line leak detectors to meet the release detection requirements for your piping. These tests are performed by a qualified technician or with an electronic LLD that is capable of detecting leaks at the rate of 0.1 gallon per hour and is performed at least once every 12 months.

You must keep records of tightness testing results at your facility until the next test is conducted. If you use a permanently installed electronic line leak detection system to do your line tightness test, you will need to have the system serviced on a periodic basis. Some systems are required to be serviced on an annual basis. Check the manufacturer's recommendations for your system.

## Detecting Small Leaks

---

### *Statistical Inventory Reconciliation (SIR)*

Statistical Inventory Reconciliation (SIR) is a mathematical process that analyzes daily inventory data to assess whether or not a leak exists in the tank or piping. SIR is conducted by a vendor whose process has been approved by the U.S. Environmental Protection Agency.

The SIR provider uses a computer program to look more closely at inventory data to statistically determine if the tank or piping has a leak. The company then provides the facility with a report indicating whether the inventory records passed or failed.

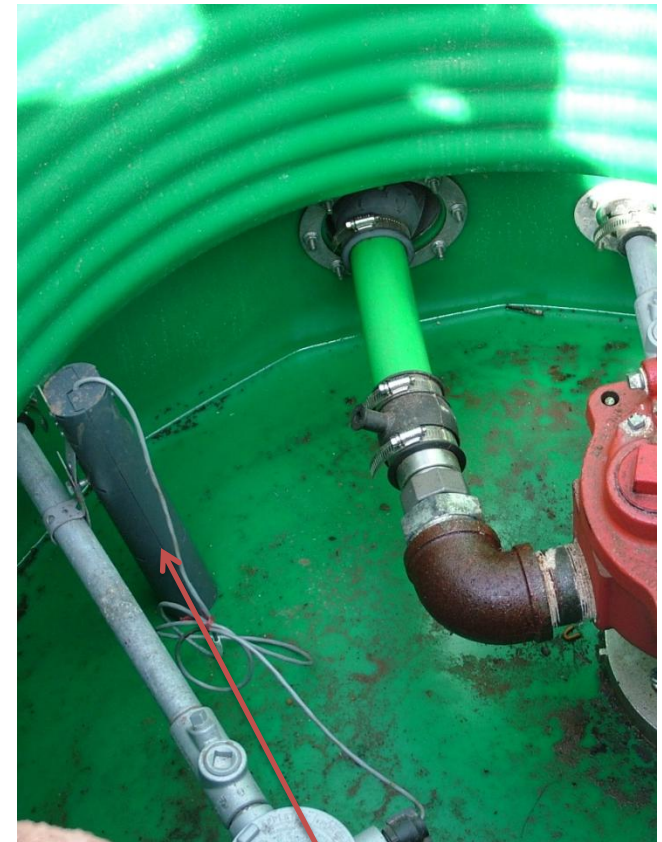
SIR can detect leaks in piping less than .2 gallons per hour. It requires that the operator of a facility to gauge the tank on a daily basis and record the results. After a month of data is collected, the information is sent to the SIR vendor for analysis. Contact your SIR vendor for specific details on procedures for recording the results.

If you use SIR as the form of leak detection for your piping, you will also be required to take the module on SIR to complete the North Dakota owner/operator training.

## Detecting Small Leaks

### *Continuous Monitoring Using Sump Sensors*

Continuous monitoring can be used to meet the release detection requirements for your piping and can be used in place of a line leak detector. The piping must be secondarily contained (double-walled) and slope down towards the sump. The monitoring must be done continuously, which requires the use of a sensor that can report back to a console. Most sensors are float sensors that detect liquids. The sensor must be placed at the lowest point in the containment area. This is so the sensor will quickly be able to detect when liquids have entered the containment area. When the sensor detects a leak, it must be able to either shutdown the turbine, trigger an alarm you can see or hear, or alert a responsible person by other means such as an autodialer.




Sensor



## Continuous Monitoring Using Sump Sensors

If you use sump sensors as the form of leak detection on your piping, you need to record the status of the sump sensors every month. In a log book or form provided by the North Dakota Department of Health, enter the sump number, the month, the year, the status of the sensor, the date recorded and your initials. The form “[Monthly Piping Interstitial Monitoring Record](#)” is available at the NDDoH Underground Storage Tank Program website to record your results.

Sample sump inspection log.  
For more information about  
sumps, see the training module  
on sumps.

**MONTHLY PIPING INTERSTITIAL MONITORING RECORD**  
North Dakota Department of Health  
Division of Waste Management - UST Program  
918 E. Divide Ave. 3rd Fl., Bismarck ND

Telephone: 701.328.5166  
Fax: 701.328.5200  
Website: [www.ndhealth.gov/wm](http://www.ndhealth.gov/wm)  
Revision: 01/2012

Facility Name: \_\_\_\_\_

Sump ID: \_\_\_\_\_ Type of Interstitial Monitoring (i.e., float sensor, etc.) \_\_\_\_\_

Month	OK (✓)	Alarm (✓)	Reason for Alarm (i.e., water, fuel, etc.)
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

**Note:** If fuel is observed in the dispenser or submersible sumps, there exists a potential leak in your piping system. The source of the fuel must be investigated and corrective action taken to address the leak. In addition, if a release of product has occurred it must be reported to the North Dakota Department of Health's Underground Storage Tank Program at 701.328.5166.

## ***Monthly Visual Inspection of Piping Sumps***

If the sumps in your double-walled piping system do not contain electronic alarms or if the alarms are not functional, you can meet the leak detection requirements for piping by visually checking all piping sumps once a month. This includes dispenser sumps. After the sumps have been visually checked, you must document that they have been checked. Documentation must include the sump's ID, the date, the condition of the sump (is water or fuel visible), and the inspector's initials. You may record the information in a log book or use a form "[Monthly Visual Inspection of Piping Sump Record](#)" that is available on the internet at the NDDoH Underground Storage Tank Operator Training Program. This documentation must then be kept on site for at least 12 months. *For pressurized piping systems, visual monitoring of piping sumps must be used in conjunction with line leak detectors in order to meet the leak detection requirements.*



Opening a sump for visual inspection

# Visual Inspection of Piping Sump Log



## MONTHLY VISUAL INSPECTION OF PIPING SUMP RECORD

North Dakota Department of Health  
Division of Waste Management – Underground Storage Tank Program  
Revision: 04/2012

Facility Name: \_\_\_\_\_

Facility Address: \_\_\_\_\_ City: \_\_\_\_\_ ND Zip Code: \_\_\_\_\_

Sump ID \_\_\_\_\_

Date Monthly Leak Check Performed	Result of Monthly Visual Inspections			Inspector's Initials
	Sump Dry	Water Observed (in)	Fuel Observed (in)	

**Note:** If fuel is observed in the dispenser or submersible sumps, there exists a potential leak in your piping system. The source of the fuel must be investigated and corrective action taken to address the leak. In addition, if a release of product has occurred, it must be reported to the North Dakota Department of Health's Underground Storage Tank Program at (701) 328-5166.